

The Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1- 34 (canceled)

Claim 35 (previously presented): An electronic circuit module comprising:

a carrier, comprising a first integrated circuit mounting location comprising a first mounting pad array, a second integrated circuit mounting location disposed on the opposite side of said first mounting pad array comprising a second mounting pad array, a ball-grid array, and a carrier interface; wherein said first and second mounting pad arrays are conductively coupled with said carrier interface;

first and second integrated circuit packages, each comprising a package body comprising an integrated circuit chip and a ball-grid array; wherein said ball-grid array of said first and second integrated circuit packages are conductively bonded to said first and second mounting pad arrays; and

a printed circuit board having at least one interconnection pad array coupled to circuitry on said printed circuit and conductively bonded to said carrier interface.

Claim 36 (previously presented): The electronic circuit module of claim 35 wherein individual mounting pads of said first mounting pad array are coupled to individual mounting pads of said second mounting pad array by means of conductive links within said carrier.

Claim 37 (previously presented): The electronic circuit module of claim 35 further comprising a flexible polymeric film comprising first and second major planar faces corresponding, respectively, to said first and second integrated circuit mounting locations.

Claim 38 (previously presented): The electronic circuit module of claim 35 wherein said carrier further comprises a recess for receiving at least a portion of said first and second integrated circuit packages.

Claim 39 (previously presented): The electronic circuit module of claim 35 wherein said carrier further comprises a semi-rigid laminar substrate having first and second major faces corresponding, respectively, to said first and second integrated circuit mounting locations.

Claim 40 (previously presented): The electronic circuit module of claim 35 wherein individual mounting pads of said first mounting pad array and said second mounting pad array are conductively coupled to individual balls of said ball-grid array on said carrier, and wherein said ball-grid array is conductively coupled to said interconnection pad array.

Claim 41 (previously presented): The electronic circuit module of claim 37 wherein said first major face is planar, and said second major face comprise a recess, said first IC package is mounted on said planar first major face and said second IC package is mounted within said recess.

Claim 42 (previously presented): The electronic circuit module of claim 35 wherein said ball-grid array on said carrier comprises balls configured in at least single row.

Claim 43 (previously presented): The electronic circuit module of claim 35 wherein said ball-grid array on said carrier comprises balls configured in a double row.

Claim 44 (previously presented): The electronic circuit module of claim 35 wherein said ball-grid array is selected from the group of Polyimide ball-grid array and ceramic ball-grid array.

Claim 45 (previously presented): An electronic circuit module comprising:

a carrier, comprising a first integrated circuit mounting location comprising a first mounting pad array, a second integrated circuit mounting location disposed on the opposite side of said first mounting pad array comprising a second mounting pad array, a ball-grid array, and a carrier interface; wherein said first and second mounting pad arrays are conductively coupled with said carrier interface; and

first and second integrated circuit packages, each comprising a package body comprising an integrated circuit chip and a ball-grid array, wherein said ball grid array of said first and second integrated circuit packages are conductively bonded to said first and second mounting pad arrays.

Claim 46 (previously presented): The electronic circuit module of claim 45 further comprising a printed circuit board having at least one interconnection pad array coupled to circuitry on said printed circuit and conductively bonded to said carrier interface.

Claim 47 (previously presented): The electronic circuit module of claim 45 wherein individual mounting pads of said first mounting pad array are coupled to individual mounting pads of said second mounting pad array by means of conductive links within said carrier.

Claim 48 (previously presented): The electronic circuit module of claim 45 further comprising a flexible polymeric film comprising first and second major planar faces corresponding, respectively, to said first and second integrated circuit mounting locations.

Claim 49 (previously presented): The electronic circuit module of claim 45 further comprising a recess for receiving at least a portion of said first or second integrated circuit packages.

Claim 50 (previously presented): The electronic circuit module of claim 45 wherein said carrier further comprises a semi-rigid laminar substrate having first and second major faces corresponding, respectively, to said first and second integrated circuit mounting locations

Claim 51 (previously presented): The electronic circuit module of claim 45 wherein said carrier further comprises individual mounting pads of said first mounting pad array and said second mounting pad array are conductively coupled to individual balls of said ball-grid array of said carrier, and wherein said ball-grid array is conductively coupled to said interconnection pad array.

Claim 52 (previously presented): The electronic circuit module of claim 48 wherein each of said first and second major faces incorporates a recess for receiving a single integrated circuit package.

Claim 53 (previously presented): The electronic circuit module of claim 48 wherein said first major face is planar, and said second major face comprise a recess, said first integrated circuit package is mounted on said planar first major face and said second IC package is mounted within said recess.

Claim 54 (previously presented): The electronic circuit module of claim 45 further comprising at least a second carrier conductively bonded with said printed circuit board.

Claim 55 (previously presented): The electronic circuit module of claim 45 wherein said ball-grid array on said carrier comprises balls configured in at least a single row.

Claim 56 (previously presented): The electronic circuit module of claim 45 wherein said ball-grid array on said carrier comprises balls configured in a double row.

Claim 57 (previously presented): An electronic module comprising:

- a carrier, comprising:

- a mounting pad array,

- a ball-grid array, and

- a carrier interface,

- wherein said mounting pad array is coupled with said carrier interface and said ball-grid array is conductively coupled with said carrier interface; and an integrated circuit package comprising:

- an integrated circuit chip, and

- a ball-grid array,

- wherein said ball-grid array on said integrated circuit package are conductively bonded to said mounting pad arrays.

Claim 58 (previously presented): The electronic module of claim 57 wherein said carrier further comprises a recess within said carrier.

Claim 59 (previously presented): The electronic module of claim 58 wherein said recesses is adapted to receive the body of a second integrated circuit package.

Claim 60 (previously presented): The electronic module of claim 57 wherein said ball-grid array on said carrier comprises balls configured in at least a single row.

Claim 61 (previously presented): The electronic module of claim 57 wherein said ball-grid array on said carrier comprises balls configured in a double row.

Claim 62 (previously presented): The electronic module of claim 57 further comprising a printed circuit board comprising at least one interconnection pad array coupled to circuitry on said printed circuit and conductively bonded to said carrier interface.

Claim 63 (previously presented): The electronic module of claim 57 wherein said ball-grid array is selected from the group of Polyimide ball-grid array and ceramic ball-grid array.

Claim 64 (previously presented): The electronic module of claim 57 wherein individual mounting pads of said mounting pad array are coupled with said carrier interface with individual balls of said ball-grid array by means of conductive links within said carrier.

Claim 65 (previously presented): The electronic module of claim 57 further comprising

a second carrier, comprising:

a second mounting pad array,

a second ball-grid array, and

a second carrier interface,

wherein said second mounting pad array is coupled with said second carrier interface and said second ball-grid array is conductively coupled with said second carrier interface;

a second integrated circuit package comprising:

a second integrated circuit chip, and

a second ball-grid array,

wherein said second ball-grid array on said second integrated circuit package are conductively bonded to said second mounting pad arrays; and

a printed circuit board having at least one interconnection pad array coupled to circuitry on said printed circuit and conductively bonded to said second carrier interface and said carrier interface.

Claim 66 (previously presented): The electronic module of claim 65 wherein second carrier further comprises a recess within said second carrier.

Claim 67 (previously presented): The electronic module of claim 57 further comprising:

a second integrated circuit package comprising:

a second integrated circuit chip, and

a second ball-grid array;

wherein said interconnection pad array on said printed circuit board comprises interconnection pads beneath the recess in said carrier and said second ball-grid array on said second integrated circuit package are conductively bonded to said interconnection array beneath the recess in said carrier on said printed circuit board.